ADAPTIVE MANAGEMENT AND MONITORING

Key Improvements in Science-Based Decision Making by State Agencies

Goals:

- *Develop and implement a decision-making system that is guided by the best available science and that uses new information generated from conservation actions.*
- *Accurately assess the responses in salmon, steelhead and trout populations and their habitat to specific strategies undertaken.*

Objectives:

- *Establish a scientific foundation for the Statewide Strategy to Recover Salmon and the monitoring component.*
- *Develop and promote the use of appropriate analysis and assessment tools, monitoring plans and guidance to support the strategy and related watershed and regional responses.*
- *Develop and promote complementary, integrated and flexible approaches for the collection, analysis and sharing of monitoring information within and across sites, watersheds and regions.*
- *Provide leadership, coordination and technical assistance to agencies and other Statewide Strategy to Recover Salmon partners.*
- *Provide information needed to prepare the Governor's Biennial "State of the Salmon" report and update the Statewide Strategy to Recover Salmon and its implementation plan.*

Outcomes

Implementation of key tools to improve science-based decision-making will support the following salmon recovery outcomes:

- *We will have productive and diverse wild salmon populations (A).*
- *Freshwater and estuarine habitats are healthy and accessible (C).*
- *Achieve cost-effective recovery and efficient use of government resources (K).*
- *Use the best available science and integrate monitoring and research with planning and implementation (L).*
- *Citizens, salmon recovery partners and state employees have timely access to the information, technical assistance, and funding they need to be successful (M).*

Sci-1.

Action: Develop, with Tribes and National Marine Fisheries Service (NMFS) and U.S. Fish and Wildlife Service (USFWS), recovery goals for listed stocks, and rebuilding targets for non-listed stocks.

Key Tasks	This task will occur in the context of several basic planning pathways, for example: 1. Comprehensive Puget Sound chinook plan development, associated 4(d) rule development and a number of watershed based recovery plans that support both 2. Hood Canal and Strait of Juan de Fuca summer chum recovery plan and associated 4(d) rule development 3. Recovery plans for each of the affected Evolutionary Significant Units (ESUs) and species groups. 4. *U.S. v Oregon* Columbia River Fish Management Plan renegotiation will have a bearing on recovery plan development in the Columbia and Snake River basins. A work planning task and its implementation will be completed to create a project management plan for each of these recovery plan and ESA take authorization processes - recovery goals for listed stocks will be a key element of these plans. Additionally, the scientific review parameters, approach and outcomes will be peer reviewed while policy assessment and decisions will be open to public participation and review to ensure accountability.
Output-workload accomplished	- Project management plans, including time lines and issue resolution strategies; - A plan for integrating the various, overlapping forums where recovery goals are discussed and developed; and - Recovery plans, including recovery goals that accommodate sustainable harvest.
Staffing (FTEs) & funding ($ and sources)	1.1 FTEs (WDFW) **Total: $**250,000 $184,000 GF-S (WDFW $ 66,000 GF-F (WDFW)
Time-line & Key milestones	July 1, 2000 - Products 1 and 2 above will be completed. The specific time lines for specific plans will be regularly updated and defined as part of project management plan development and implementation.

Responsible Agency (ies)	**Coordinated** effort between WDFW and Tribes. This planning and evaluation activity is typical of co-manager work plans in general. Some review will occur at a broad multi-tribe/state/federal general level, but is important that local Tribal and state staff be heavily involved in this activity since project planning, evaluation and adaptive management occurs at the geographic scale of watershed. Peer review and policy oversight will be closely integrated. Significant public interaction is anticipated given the level of locally based recovery efforts and the interaction among all "4-H" impact areas.

Sci-2.

Action: Establish and implement a technical and scientific review process (i.e. science review team) for restoration/protection projects and activities funded by the SRFB and other state funding programs (e.g. WSDOT, and WDFW).

Key Tasks	1. Develop briefing paper for the Governor examining all scientific and technical review groups established for salmon recovery; and recommending a comprehensive streamlined mechanism to handle scientific aspects of salmon recovery as well as an appropriate project review structure. 2. Create science workgroups to address specific scientific review tasks including grant proposal evaluation; grant program criteria; resource allocation recommendations; local and regional planning technical support; monitoring and assessment issues (standard monitoring indicators, data quality guidelines, systematic and periodic evaluation of monitoring data); etc. 3. Incorporate guidance of science group and workgroups into all aspects of salmon recovery projects/activities. 4. Ensure regular information dissemination from the science group and workgroups to all relevant parties and processes. 5. Ensure regular feedback to science group from all relevant parties and processes, including major new research findings.
Output-workload accomplished	High quality scientific review and information will guide all aspects of salmon recovery funding and project implementation.
Time line & Key milestones	December 2000-January 2001, or sooner.
Staffing (FTEs) & funding ($ and sources)	0.2 FTE (WDFW) **Total:** $55,420 $20,020 SRA (IAC) $35,400 GF-S (IAC $2,000; WDFW $33,400)
Responsible Agency (ies)	**Cooperative** effort with IAC lead carrying out the above activities in cooperation with WDFW, GSRO, ECY, WSDOT, DNR, PSAT, CTED, and Tribes.

Sci-3.

Action: Provide independent scientific review and oversight of the state's salmon recovery efforts.

Key Tasks	Pursuant to Salmon Recovery Planning Act (ESHB 2496) and Salmon Recovery Funding Act (2E2SSB 5595), the Independent Science Panel (ISP) was created and charged with providing scientific oversight of salmon recovery activities and reviewing salmon recovery plans at the request of the Governor's Salmon Recovery Office (GSRO). In their strategic oversight role the ISP will assist coordination among independent scientific review panels, provide consultative advice on matters of science to others (e.g., Salmon Recovery Funding Board), and conduct focused analyses/reviews of specific elements of the state's salmon recovery efforts as may be warranted by the ISP.
Output-workload accomplished	As assigned, reports of scientific review comments on salmon recovery plans. Self-initiated technical memoranda, analyses, and reports: - Technical Memorandum 2000-1 to the Salmon Recovery Funding Board (1-12-00): "Preliminary Review of Issues Regarding Development of a Statewide Recovery Monitoring Program"
Time line & Key milestones	July 1999 – Start-up Milestone(s) - Per Independent Science Panel work plan: - Spring 2000 - Review Statewide Strategy to Recovery Salmon
Staffing (FTEs) & funding ($ and sources)	.1 FTE (GSRO) **Total:** $155,000 $155,000 GF-S (GSRO) The five ISP members are compensated through individual personal service contracts or interagency agreements. Approximately 70% of the ISP's $200,000 budget ($140,000) is devoted to scientific oversight, science coordination, plan reviews, and other analyses/reports. (See also **Mon-8**, for complementary ISP activity on monitoring and data.)
Responsible Agency (ies)	**Coordinated** effort with the ISP and GSRO co-lead. The science panel is responsible for providing independent scientific oversight and completing plan reviews as requested. The GSRO will provide staff support to the panel and will communicate results of panel reviews to other agencies. Other agencies may be involved as requested by the GSRO or ISP.

Sci-4.

Action: Facilitate coordination and application of science in statewide salmon recovery strategies and programs and develop science-based criteria for watershed assessment.

Key Tasks	Science has a key role in guiding agency strategies, programs, and activities associated with the Statewide Strategy to Recover Salmon at project site, watershed, regional, and statewide scales. In addition, several state agencies create and/or synthesize scientific information for use in their and other programs. For example, WDFW has primary expertise in fish, wildlife, and habitat related to those resources. Similarly, ECY has primary expertise in hydrology, water quality, and watershed management. Key tasks: 1. Foster development of science coordination and delivery mechanisms for salmon recovery activities. Such mechanisms would provide key support for the Salmon Recovery Funding Board, lead entities and other recovery planning organizations, state agency initiatives associated with the statewide salmon strategy, watershed assessment, monitoring and data guidelines, independent scientific review panels/teams, federal services and others working on salmon recovery. 2. Develop a process and an implementation plan for science coordination and delivery systems. 3. Develop statewide watershed assessment criteria.
Output-workload accomplished	A process to develop and implement a science coordination and delivery system will be developed. An implementation plan will be developed and monitored. Statewide watershed assessment criteria will be developed. See **Reg-2**.
Time line & Key milestones	July 2000 - Initial outline and framework. October 2000 - Science coordination implementation plan. December 2000 – Statewide watershed assessment draft criteria will be developed. See **Reg-2.**
Staffing (FTEs) & funding ($ and sources)	.9 FTE (GSRO 0.5; WDFW 0.4) **Total:** $141,800 $141,800 GF-S (GSRO $75,000; WDFW $66,800) Agencies will use current staff to implement the product of this action.
Responsible Agency (ies)	**Cooperative** effort with the GSRO lead with WDFW, ECY, IAC, CC, WDA, DNR, WSDOT, and PSAT. Tribes, federal and local governments, and other partners are expected to participate. Each agency with resources for development and use of scientific information has lead responsibility for the effective use of the resources associated with use of science and in sharing scientific information. GSRO will facilitate coordination of agency efforts and will develop watershed assessment criteria.

Sci-5.

Action: Standardize science methodology to characterize stream hydrology and runoff rates and research stormwater technology design, cost benefit and know-how to effectively address storwater problems.

Key Tasks	1. Develop acceptable methodology on stormwater design 2. Update existing stream hydrology and runoff models- hydrologic modeling protocol will include: mapping hydrologic zones, instrument installation, collection of data, develop curve number grid for Washington and initial model representation using current modeling methods. 3. Develop sustainable soil augmentation and landscaping practices. 4. Support the reevaluation of retention/detention system designs to minimize alterations in runoff peak flows and duration and develop a methodology to select retention/detention systems based on watershed needs or recovery plans. Methods to be investigated include: -Optimize infiltration and other best management practices designs for western and eastern Washington conditions. -Standardize and coordinate construction, agricultural, mining, and timber harvest practices to reduce runoff volumes and erosion within watersheds. 5. Develop science-based standards for vegetative retention and riparian buffers. 6. Establish maintenance protocols for existing stormwater treatment systems and/or protocols how to control pollutants and/or flow at their source. 7. Investigate low- or zero-impact development methods.
Output-workload accomplished	Technology and management accepted methodology on how to design stormwater treatment quality and quantity systems consistent with fish and habitat protection needs and watershed protection goals.
Time line & Key milestones	6 years 1999-2005
Staffing (FTEs) & funding ($ and sources)	.5 FTE (WSDOT) **Total:** $375,000 $375,000 MVA (WSDOT)
Responsible Agency (ies)	**Coordinated** effort with WSDOT lead. ECY and PSAT are participants in the effort.

Mon-1.

Action: Facilitate development of a comprehensive statewide monitoring framework to integrate and/or coordinate statewide, regional, watershed and project monitoring systems, within 4 years.

Key Tasks	Initial work on a comprehensive, integrated salmon recovery monitoring framework that addresses implementation, effectiveness, and validation monitoring at multiple spatial and temporal scales was outlined in the Statewide Strategy to Recover Salmon (SSRS). The Salmon Recovery Scorecard (SRS) will provide an essential framework for development of performance standards and performance monitoring for the statewide strategy. Further development and refinement of details of the framework and development of monitoring implementation plans are needed. Key tasks: 1. Expand and improve the comprehensive statewide monitoring framework presented in the SSRS. 2. Refine comprehensive monitoring planning needs, identify those that are currently met and unmet, and identify improvements and resource needs to bolster interagency coordination and implementation at multiple scales.
Output-workload accomplished	The SRS, comprehensive statewide monitoring framework, and related implementation plans will guide development of monitoring efforts, increase alignment and consistency across agencies, and provide information and support to salmon recovery partners.
Time line & Key milestones	Spring 2000 - Salmon Recovery Scorecard Fall 2000 - Comprehensive statewide monitoring framework Four years - Completion
Staffing (FTEs) & funding ($ and sources)	0.9 FTE (GSRO 0.25; WDFW 0.65) **Total:** $160,200 $160,200 GF-S (GSRO $37,500; WDFW $88,700) $ 17,000 ALEA (WDFW) $ 17,000 RFEG (WDFW)
Responsible Agency (ies)	**Cooperative** effort with GSRO lead. Scorecard Project Management Team specifically WDFW, Ecology, DNR, PSAT, IAC, Tribes, and others as appropriate, will collaborate to facilitate refinement of the comprehensive statewide monitoring framework. Other – Coordinate with ISP, SRFB, federal agencies, and other appropriate entities/partners.

Mon-2.

Action: Develop criteria and guidelines for monitoring and adaptive management components of salmon recovery plans.

Key Tasks	The Statewide Strategy to Recover Salmon commits the state to develop recovery plans with monitoring and adaptive management components. 1. Develop criteria and guidelines regarding the definition and use of adaptive management and monitoring in recovery plans.
Output-workload accomplished	Criteria and guidelines for monitoring and adaptive management and their use by state agencies in recovery planning will be developed. Link to development of a comprehensive statewide monitoring program and programmatic ESA compliance plans. Key questions and their relationships to adaptive management and monitoring will be clarified.
Time line & Key milestones	Fall 2000 - Comprehensive statewide monitoring framework. See **Mon-1** Completion – To be determined
Staffing (FTEs) & funding ($ and sources)	0.45 FTE (GSRO 0.25; WDFW 0.2) **Total:** $70,900 $70,900 GF-S (GSRO $37,500; WDFW $33,400)
Responsible Agency (ies)	**Cooperative** effort with GSRO and WDFW co-lead. Other cooperators are ISP, other science teams, Tribes, ECY, PSAT, and DNR.

Mon-3.

Action: Implement *the Puget Sound Ambient Monitoring Program* (PSAMP) to monitor and assess the effects of pollutants on salmon.

Key Tasks	1. Implement PSAMP- long-term effort to comprehensively monitor freshwater, marine biological resources, nearshore habitat, sediment and assess the effects of contaminants on fish. 2. Coordinate/integrate to the extent possible with other monitoring activities conducted by state, federal, tribal, local agencies and universities. 3. Analyze data, summarize findings of monitoring program and evaluate performance of programs and projects.
Output-workload accomplished	Long-term water quality monitoring and assessment program for Puget Sound. Report on the effects of contaminants on salmon and overall health of the Puget Sound.
Timeline & Key milestones	Ongoing – Monitoring December 2000 - State of the Salmon Report Every 2 years - report issued on the health of Puget Sound
Staffing (FTEs) & funding ($ and sources)	**Total:** $2,565,074 $2,298,969 GF-S (ECY $1,943,769; PSAT $355,200) $266,115 GF-F (ECY $244,000; PSAT $22,115)
Responsible Agency (ies)	**Cooperative** effort with ECY lead. PSAT, DNR, DOH, Tribes and others as appropriate are cooperators.

Mon-4.

Action: Salmonid Stock Inventory Project (SaSI) - Update data on current SaSI and integrate SaSI data with Salmon and Steelhead Habitat Inventory and Assessment Program (SSHIAP) to allow tracking of salmonid recovery.

Key Tasks	The 1993 Salmon and Steelhead Stock Inventory (SASSI) summary report and regional data appendices was the first organized approach to summarize assessment data statewide. Appendix for Bull Trout and Dolly Varden was published in 1997 (updated in 1998). SASSI was retitled Salmonid Stock Inventory (SaSI) to reflect a broader salmonid assessment effort. A SaSI appendix for coastal cutthroat trout is nearing completion, and a status review for westslope cutthroat was recently completed. An appendix will be developed. SaSI information for salmon, steelhead, and bull trout is available in the SSHIAP system for WRIAs 1-23. The SaSI update effort has short- and long-term work tasks designed to: 1. Oversee structure, approaches, and production of SaSI updates; 2. Lead design of refinements to address weaknesses and needs. (These include, for example: linkages with SSHIAP and addition of other species; 3. Ensure and automate data from field collection to summarization stage with appropriate quality control; 4. Work with regional state, tribal and federal scientists on improved assessment methodologies, identifying priority information gaps and staffing needs; 5. Ensure routine production of reports and data access; and 6. Facilitate/assist additional analytical work and modeling that utilizes SaSI and associated information. *Note:* The SaSI Project is linked to WDFW's Salmonid and Habitat Inventory, Monitoring, and Recovery Program (SHIMR), WDFW smolt/adult monitoring, the WDFW/NWIFC Salmonid Habitat Inventory and Assessment Project (SHIAP), WDFW Smolt Monitoring Project, Regional stock assessment activities, and the Habitat Productivity Monitoring Project.
Output - work accomplished	Update of SaSI report and appendices. Integration of SaSI data into the SSHIAP database. This is a long-term monitoring project, which could become part of the agency's on-going research, and result in annual reports.

Time line & Key milestones	August 1, 1999 - Complete coastal cutthroat appendix, public access by June 30, 2000. January 1, 2000 - Identify priorities for developing improved assessment methodologies and filling data gaps for unknown stocks. September 1, 2000 - Design/refine data system flow and quality control procedures. September 1, 2000 - Develop fully digital mapping capabilities for documenting freshwater population distribution. January 1, 2001 - Complete data update for existing salmon and steelhead populations, public access by June 30, 2001. January 1, 2001 - Develop changes in SaSI protocol and parameters to strengthen status monitoring of wild populations. June 30, 2001 - Develop agreed methodology for building total cohort abundance data for index chinook and coho populations or management units. September 1, 2001 - Update coastal cutthroat appendix. January 1, 2002 - Update bull trout appendix and incorporate westslope cutthroat status review into SaSI/SSHIAP system. June 30, 2002 - Update salmon and steelhead appendices. January 1 each year - Provide "state of the salmonid resource" status synthesis.
Staffing (FTEs) & funding ($ and sources)	3 FTEs (WDFW) **Total:** $400,000 $400,000 SRA (WDFW) In addition, existing staff support and outside coordination (e.g., Tribal coordination for western Washington and the Columbia River basin) and scientific peer review will be needed.
Responsible Agency (ies)	**Cooperative** effort with WDFW and Tribes co-lead. The CC is working with state and Tribal biologists to refine SaSI population distributions in freshwater habitats to assist the limiting factors identification

Mon-5.

Action: Develop existing Salmon and Steelhead Habitat Inventory and Assessment Program (SSHIAP) to aid identification of problem areas, and allow tracking of salmonid recovery and habitat improvements; incorporate SaSI stock information.

Key Tasks	SSHIAP is a public-tribal-private GIS-based information system that catalogs and tracks physical habitat conditions and stock distribution/status of salmon in Washington. This is a significant long-term data system, which is fundamental to supporting and monitoring trends in salmon habitat recovery and improvements in stock distribution/status. The basic SSHIAP data system is in place. The primary performance measure is in having a statewide data system that can track habitat conditions and stock distributions, and provide guidance to managers and policy makers for future salmon conservation activities. Key Tasks: 1. Expand geographic information system to WRIAs 24-62 and estuarine/marine areas; 2. Update salmon stock distribution information; and 3. Eevelop delivery mechanisms for SSHIAP system data to partners and other users.
Output-work accomplished	A statewide, GIS-based information system, with Internet-based delivery mechanisms. This data system catalogs salmon habitat and salmon stock distribution/status at a 1:24,000 scale.
Time line & Key milestones	Project started in 1995 by NW Indian Fish Commission. July 1, 1999 - Began expansion of SSHIAP. Underway - Acquisition of specific salmon habitat data (as per Limiting Factors Analysis) for WRIAs 24-62 Summer 2000 - Integration of Estuarine/Marine-nearshore information December 2000 - Web-based delivery aspects operational
Staffing (FTEs) & funding ($ and sources)	7 FTEs (WDFW) **Total:** $1,000,000 $1,000,000 SRA (WDFW [SRFB grant])

Responsible Agency (ies)	**Collaborative** effort with WDFW and Tribes co-lead. SSHIAP has been co-led by the NWIFC and WDFW. More than 35 other agencies and entities are contributing to SSHIAP. The strong partnerships between the Tribes, WDFW, and supporting partners is fundamental to SSHIAP. The list of SSHIAP partners will grow during the next biennium, as SSHIAP expands into WRIAs 24-62 and estuarine/marine-nearshore areas. SSHIAP functions as a hub of salmon habitat information, with partnering entities contributing their datasets and in-kind support, and acquiring information from the larger SSHIAP/SaSI system.

Mon-6.

Action: Expand annual spawner abundance monitoring and improve annual abundance databases so that success of recovery strategy can be measured.

Key Tasks	Spawner surveys and associated data compilation and analysis
Output - workload accomplished	Completed assessments of spawner abundance on key index streams annually. Abundance described as number of animals/index watershed. Initial performance measures would be completion of escapement counts and generation of watershed totals. These numbers are then incorporated in run-reconstruction models, abundance forecasts, and pre-season planning fishery models.
Time line & Key milestones	This is an annual ongoing activity, the timing of which is specific to species and watershed. Surveys generally begin in late summer and proceed through the following spring.
Staffing (FTEs) & funding ($ and sources)	9.2 FTEs (temp field crews) (WDFW) **Total:** $554,000 $270,000 GF-S (WDFW) $238,000 GF-F (WDFW) $ 46,000 GF-P/L (WDFW)
Responsible Agency (ies)	**Cooperative** effort with WDFW and Tribes co-lead. WDFW and Washington Treaty Tribes each have responsibility to provide stock assessment efforts on key streams critical to management of the fish resource. WDFW is responsible for a statewide stock assessment effort within its six administrative regions. Individual Tribes provide specific stock assessment efforts within their local watersheds as their funding allows. All stock assessment information is assimilated in run-reconstruction models or other databases and represents joint state/tribal management efforts. This task, as well as the development of fishery management plans, is a WDFW/Tribal cooperative effort.

Mon-7.

Action: Continue and expand freshwater productivity research to measure improvements in egg-to-migrant survival so success of habitat restoration actions can be evaluated and initiate habitat monitoring in several of the productivity research areas.

Key Tasks	1. Monitor key watersheds throughout the state to enumerate the number of anadromous salmonid smolts produced. This is done with the use of specialized floating trapping devices that capture migrating smolts unharmed for the collection of biological data and then released to continue their migration. There is presently a network of projects throughout the state with the objective to enumerate the number of anadromous salmonids that emigrate from key index watersheds. Present efforts cover 14 major watersheds. 2. New funds from the legislature as well as new contract funds from local sources will allow the establishment of at least seven more sites over the next biennium and will also be used to initiate habitat monitoring in 5 of these key watersheds. 3. Produce annual reports. The data are universally accessible by both co-management parties and much of these data are incorporated in joint fish management processes to develop forecasts of future run sizes and the design of fishery strategies.
Output - workload accomplished	A report of the number of smolts migrating from each watershed is produced each year. These data are incorporated into future run forecasting procedures as well as in the long-term database used to develop basin productivity/habitat relationships. Successful estimates of smolt out-migration are generated annually for key watersheds. Estimates are incorporated in annual reports and used to predict annual future run size estimates of anadromous salmonids. In addition, habitat monitoring reports will be produced annually, which allows better link between smolt production and habitat conditions.
Time line & Key milestones	Ongoing - Annual reports are prepared, which reflect the previous year's results.
Staffing (FTEs) & funding ($ and sources)	20.6 FTEs (WDFW 19.6; ECY 1) **Total:** $2,157,000 $1,100,000 SRA (WDFW) $ 182,000 GF-S (ECY) $ 555,000 GF-F (WDFW) $ 320,000 GF-P/L (WDFW)

Responsible Agency (ies)	**Coordinated** with WDFW and Tribes co-lead for the smolt research. ECY and WDFW are co-lead for habitat monitoring. The majority of these efforts are managed under contract by WDFW. However, several locations are managed by Tribal governments.

Mon-8.

Action: Provide independent scientific input to monitoring planning, data quality, and evaluation of monitoring data in support of the state's salmon recovery efforts.

Key Tasks	The Independent Science Panel (ISP) will review, assess, and develop recommendations regarding standardized monitoring and data quality guidelines for use by entities involved in habitat projects and other recovery activities across the state. They will also review, analyze, and develop criteria and systems to assist salmon agencies and other partners in evaluating the qualities of data obtained through effectiveness monitoring efforts.
Output - workload accomplished	A report of recommendations and other findings of the ISP regarding monitoring, data quality, and evaluation of monitoring data will be provided in a report to the legislature and the Governor. The panel's recommendations may be contained in the Governor's biennial State of the Salmon Report.
Time line & Key milestones	December 31, 2000 - Report to the Governor and the legislature.
Staffing (FTEs) & funding ($ and sources)	.1 FTE (GSRO) **Total:** $75,000 $75,000 GF-S (GSRO) The five ISP members are compensated through individual personal service contracts or interagency agreements. Approximately 30% of the ISP's $200,000 budget ($60,000) is devoted to monitoring and data work. See also **Sci-3** for complementary ISP activity on scientific review and oversight of the state's salmon recovery efforts.
Responsible Agency (ies)	**Cooperative** effort with ISP lead – The ISP is responsible for providing monitoring, data quality, and data analysis recommendations. The Governor's Salmon Recovery Office provides staff support to the ISP and communicate ISP recommendations to other agencies.

Mon-9. **Action:** Monitor marine and estuarine vegetation.	
Key Tasks	1. Design a protocol for monitoring submerged vegetation. 2. Collect submerged vegetation monitoring data, summer 2000, using the protocol developed. 3. Monitor broad scale submerged vegetation (eelgrass) trends in distribution and abundance in Puget Sound at sampling sites. 4. Coordinate the monitoring of submerged vegetation with monitoring conducted under the Puget Sound Ambient Monitoring Program.
Output - workload accomplished	A data summary on submerged vegetation and analysis of the protocol with suggestions for improvement will be completed.
Time line & Key milestones	Summer 2000 - Submerged vegetation monitoring data collected. Fall 2000 - Analysis of trends in distribution and abundance at sampling sites will be done.
Staffing (FTEs) & funding ($ and sources)	See **Dat-7** for FTE and $.
Responsible Agency (ies)	**Coordinated** effort with DNR lead. The effort is coordinated with University of Washington, Marine Resources Committees and various agencies involved in the Puget Sound Ambient Monitoring Program (PSAT)- see **Mon-3**.

Dat-1.

Action: Develop water typing model and move new water typing codes into GIS for mapping, to support Forests and Fish Report.

Key Tasks	1. Model fish habitat using geographically-based criteria such as basin size, stream gradient, precipitation and elevation to determine what protection is needed in forested streams. 2. Apply "last fish habitat" points from model to the DNR hydrography data layer.
Output – workload accomplished	New water typing system that better identifies where fish may occur and where habitat should be protected.
Time line & Key milestones	1999-2001 Biennium.
Staffing (FTE) & funding ($ and sources)	**Total:** $500,000 $500,000 GF-F (DNR) Source of funds may be variable due to timing of availability and constraints of some sources.
Responsible Agency (ies)	**Coordinated** effort with DNR lead and with ECY support.

Dat-2.

Action: Advance development of the Washington Framework data themes, and complete initial implementation of Hydrography, Cadastral, and Transportation Framework data themes.

Key Tasks	1. Plan and implement upgrades to statewide GIS databases within the guidelines and standards of the Washington State Framework data themes. 2. Secure funding to clean-up and convert hydrography and forest roads data sets for forested watersheds (2/3 of state). 3. Complete a Hydrography Framework standard data model. 4. Implement data clean-up and conversion of currently available digital hydrography and forest road data for forested watersheds (2/3 of state). 5. Seek funding to complete a feasibility study and prototype work for a full Transportation Framework project for road data. 6. Seek funding to expand the Cadastral Framework beyond the initial implementation including support for partner data integration and partner start-up. 7. Plan and recruit sponsorship of framework projects for orthophotography, topography and land use / land cover. 8. Conduct a study on natural resources data management and identify improvement opportunities.
Output-workload accomplished	More robust transportation and hydrography data sets to support the new requirements of the Forests and Fish agreement.
Time line & Key milestones	1999-2001. Several activities will be longer term (five years and more).
Staffing (FTEs) & funding ($ and sources)	2 FTEs (WSDOT 1; WDFW 1) **Total:** $3,430,000 $ 571,000 SRA (DNR) $1,217,000 GF-F (DNR) $1,392,000 GF-S (DNR $1,245,000; WDFW $147,000) $ 250,000 MVA (WSDOT)

Responsible Agency (ies)	**Collaborative** effort with DNR lead. The Washington State Geographic Information Council (WAGIC) has the official authority for state participation in the National Spatial Data Infrastructure's Framework Program. This responsibility is generally implemented by a sub-committee called the Framework Management Group. DNR staffs the Framework Management Group by coordinating overall statewide Framework project implementation. DNR also directly manages the Cadastral Framework project, co-manages the Hydrography Framework project, and coordinates an internal forest roads project with the full Transportation Framework project. ECY co-manages the Hydrography Framework project. WSDOT is the lead to develop the full Transportation Framework project. Tribes are actively coordinating this action with SSHIAP and other Tribal data activities. Data for all Framework layers will be contributed by "data provider" partners at the federal, state and local levels. Other cooperators include WDFW, IAC and CTED.

Dat-3.

Action: Develop and implement a "tactical" plan for salmon recovery information management.

Key Tasks	1. Develop web-based survey to poll data users and providers about the requirements for integration, accessibility, usability, importance, degree of analysis/technical ability required for use, and geographic coverage and geographic data accuracy. 2. Develop tactical plan (using results of the survey and other information). 3. Coordinate and facilitate issue resolution regarding information management and interface between Information Technology (IT) and salmon recovery data stewards and others. 4. Identify and communicate potential statewide infrastructure and cross-agency IT capabilities (using results of the survey). 5. Coordinate IT policy and standards as they relate to salmon recovery information management (using results of the survey and other information).
Output – workload accomplished	Coordination and collaboration on infrastructure needs and recommendations for a salmon recovery information management plan.
Timeline & Key milestones	Ongoing - Note; tasks 2, 3, 4, and 5 will take much longer to accomplish absent a Salmon Information Management (SIM) Coordinator. Funding and support for a SIM Coordinator will be requested from JNRC in early June 2000. June/July 2000 - Survey results, analysis of responses is planned for August/ September 2000. September 2000 - Tactical Plan (this timeline is contingent on having the SIM Coordinator on board end of June early July 2000.)
Staffing (FTEs) & funding ($ and sources)	**Total:** $15,000* $15,000 GF-S (GSRO) Survey cost
Responsible Agency (ies)	**Collaborative** effort with DIS and ECY co-lead, facilitating the discussion and development of the products. Other collaborators include GSRO, ECY, DNR, WSDOT, WDFW, WDA, Tribes, and others as appropriate.

Dat-4

Action: Develop and implement the Integrated Natural Resources Data System (In-roads) pilot project.

Key Tasks	1. INRDS Project Design 2. Requirements Specifications 3. INRDS System Design 4. INRDS Development/Implementation 5. Unit Formal Testing 6. System Integration and Testing 7. Documentation Training, System Delivery
Output – workload accomplished	- The goal of the Snohomish Basin Demonstration Project is to develop and deploy an expandable watershed information management and analysis system that provides the infrastructure to integrate disparate data sets and retrieve information efficiently. - INRDS will demonstrate that spatial data can be integrated with more detailed "tabular" environmental data to improve the ability and consistency of watershed-based planning and decision making. - The system will aid in defensible decision making by generating reports that provide detailed meta data of the information accessed for a given region. The system will also provide a vehicle in which effective cross-boundary and cross-cultural watershed education can occur.
Timeline & Key milestones	December 2000 - Report on concept model
Staffing (FTEs) & funding ($ and sources)	.2 FTE (WSDOT) **Total:** $175,000* $175,000 MVA (WSDOT) * $150,000 contract with the Pacific Northwest National Laboratory
Responsible Agency (ies)	**Collaborative** effort with WSDOT and Tribes co-lead with the Pacific Northwest National Laboratory developing draft materials, soliciting funds, and implementing the pilot project. ECY, DNR, CTED, Washington Geographic Information Council (WAGIC), NMFS, other federal agencies and non-governmental organizations help shape the project and provide data.

Dat-5.

Action: Image and make water rights information in critical basins available electronically for use in developing water budgets and maps.

Key Tasks	1. Design imaging project; 2. Work with contractor to image documents from paper and microfiche; 3. Make imaged documents available electronically to watershed groups, agencies and others through the Internet; and 4. Develop more accurate Geographic Information System (GIS) maps.
Output – work accomplished	- 4.5 million sheets of paper or microfiches contained in water resources documents will be scanned. - Desktop image retrieval capability is available. - Data assistance to local watershed groups and agency staff is provided.
Timeline & Key milestones	June 30, 2001 - On or before, complete the scanning. Begin sharing data and provide assistance to watershed groups and agency staff as scanning, indexing, and image retrieval system development is completed.
Staffing (FTEs) & funding ($ and sources)	1 FTE (ECY) **Total:** $ 657,000 $657,000 GF-S (ECY)
Responsible Agency (ies)	**Coordinated** effort with ECY lead.

Dat-6.

Action: Track funds allocated for salmon habitat projects and activities and distribute or provide easy access to information on state and federal funds expended on salmon recovery efforts.

Key Tasks	1. Collect and incorporate salmon project and activity data into IAC's Project Inventory Management System (PRISM) database to store, manage, and track information about salmon recovery projects funded by the Salmon Recovery Funding Board (SRFB). Update and improve database periodically as needed. 2. Develop an interactive map Internet site showing funded salmon projects (complete with descriptions of projects, funding amounts, site information, etc.). 3. Coordinate information with WDFW to insure update of SSHIAP and SaSSI databases. 4. Share GIS and other information on funded salmon projects state, local and federal agencies and others as needed. 5. Develop and provide funding information on the Internet about salmon recovery grant cycles, application policies and procedures, evaluation criteria, schedules, etc. 6. Provide links to other appropriate sites such as the Transportation Improvement Board Funding Sources Database.
Output – workload accomplished	All salmon recovery project funding will be tracked through PRISM and ISIS (Integrated Salmonid Information System). Information will be easily accessible to all through generic and customized reporting mechanisms, Internet, and electronic data sharing. See **Reg-6** and **Reg-7** actions on the SRFB grants allocation.
Time line & Key milestones	On-going
Staffing (FTEs) & funding ($ and sources)	7 FTEs (WDFW) **Total:** $323,700 $208,098 SRA (IAC) $ 61,652 GF-S (IAC $37,902; WDFW $23,750) $ 23,000 ALEA (WDFW) $ 23,750 RFEG (WDFW) $ 7,200 WF-S (WDFW)
Responsible Agency (ies)	**Cooperative** effort with IAC lead. WSDOT, ECY, CTED, CC and WDFW and participants.

Dat-7. **Action:** Inventory nearshore habitat.	
Key Tasks	1. Inventory and map intertidal habitats in the Puget Sound and Washington's coast. 2. Integrate nearshore inventory information with monitoring data on nearshore habitat conducted by the Puget Sound Ambient Monitoring Program and other information e.g. stock status. 3. Develop and distribute (CD-ROM), and user-friendly maps (GIS) and videos of shoreline habitat to support local shoreline planning and regulations.
Output – workload accomplished	Digital data (GIS compatible with Framework, see Dat-2 and Dat-4) and improved information on nearshore habitat are available to state, federal and local governments for use to protect and restore nearshore habitat.
Time line & Key milestones	Early FY 2000 - Inventory done June 30, 2001 - All local government along the Puget Sound and Coast will have copies of pertinent digital data (GIS compatible with Framework, see **Dat-2** and **Dat-4** above), videos, and other information on intertidal habitat.
Staffing (FTEs) & funding ($ and sources)	**Total:** $786,800* $786,800 ALEA (DNR) *includes $80,000 supplemental enhancement.
Responsible Agency (ies)	**Cooperative** effort with DNR lead. ECY will participate in providing coastal jurisdiction inventory information on nearshore, within their jurisdiction. Tribes are also active participants.

Res-1.

Action: Continue fish ecology research, such as investigations of survival, population genetics and demographics, fish presence and habitat use by life stage, so that improvements in these population ecology elements (resulting from recovery activities) can be evaluated.

Key Tasks	Research and assessment projects are located throughout the state and cover topics such as salmonid population demographics characterization, interactions between hatchery and wild fish, development and evaluation of endangered fish stock recovery programs. Development of fish identification and tagging methods, and better more efficient ways to produce fish while limiting ecological interactions have been priority issues in relation to the ESA and implementation of the Wild Salmonid Policy. Specific examples of the above include a comprehensive research and evaluation project dedicated to the Lower Snake River Compensation program (e.g. Lyons Ferry program evaluation for Tucannon Spring Chinook, Mitchell Act evaluation, and mid- lower-Columbia mitigation under various relicensing mitigation agreements) which deals with mitigation and stock recovery programs for steelhead and chinook salmon--and development of an automated method to externally mark hatchery produced salmonids so that they may be identified in selective fisheries as well as during broodstocking and stock assessment activities--and development of a method to determine whether a salmonid captured in a stream environment is anadromous or resident (often a critical question under the ESA).
Output-workload accomplished	The vast majority of research and development projects undertaken are funded from federal, local, and other outside sources. WDFW provides annual reports of accomplishments to the funding agents and as information and analysis becomes available, researchers aggressively publish in agency technical and national/international peer reviewed journals. Ecological research and development projects have interim and long-term performance measures. Annual reports and technology transfer are available to management entities to capitalize on needed abundance and demographics information collected in association with the research. The long-term performance measure of such a project is to produce literature accessible by scientific peers as well as management entities for incorporation into management plans and procedures.
Time line & Key milestones	Timelines are project and funding source specific, though research results are usually provided annually.

Staffing (FTEs) & funding ($ and sources)	55.1 FTEs (WDFW) **Total:** $3,710,000 $2,150,000 GF-F (WDFW) $ 260,000 GF-S (WDFW) $1,300,000 GF-P/L (WDFW)
Responsible Agency (ies)	**Cooperative** effort with WDFW lead. WDFW interacts with affected Tribes and local governments as contractor, collaborator, cooperator, and source of scientific information. Much of WDFW research is done within state/tribal/local frameworks such as the Northwest Power Planning Council, Mid Columbia Committee, and Lower Snake River Compensation Program (USFWS), and various agency advisory groups. The results of WDFW research becomes available to interested parties via agency technical reports, contract reports or literature articles.

Res-2. **Action:** Conduct studies related to harbor seal and caspian tern predation on salmonids.	
Key Tasks	Caspian Tern: Objective is to determine if displaced terns from the Columbia are occupying former or new sites elsewhere in Southwest Washington. 1. Participate in Caspian Tern Working Group (CTWG) development of Year 2000 Action Plan. 2. Identify potential nesting and roosting sites in Southwest Washington, South Puget Sound, North Puget Sound. 3. Conduct aerial, ground, and boat surveys of those sites, monitor known nesting site in Tacoma. 4. Conduct baseline research on the Tacoma colony: food habits, reproduction, colony attendance. Harbor seal salmon predation study: Objective of the study is to determine the level and distribution of salmonid predation by harbor seals in Hood Canal. The focal salmonid species of concern is the listed Hood Canal summer chum.
Output-workload accomplished	Terns: Obtain current map locations and species population data on former or new sites where terns may be attempting to nest. Products will be maps, data, summary reports for surveys. Draft research analyses and reports for Tacoma site. Harbor seals: Final estimates of the number of summer chum eaten by harbor seals in Hood Canal. Determination of the importance of harbor seal predation on recovery of this listed stock. Management recommendations that incorporate research results.
Time line & Key milestones	July 1, 1999-September 30, 2000 - CTWG. May 1-September 30, 2000 - Surveys and Research. Will continue if additional funds are allotted for FY01.
Staffing (FTEs) & funding ($ and sources)	2.9 FTEs (WDFW) **Total:** $310,000 $ 50,000 SRA (WDFW-tern) $260,000 GF-F (NMFS-harbor seal) *Note:* (additional $150,000 expected in continuation money summer/fall 2000). 100% of funds come to us as research grants NMFS through Pacific States Marine Fisheries Commission (PSMFC).

Responsible Agency (ies)	Caspian terns: WDFW staff are directly communicating with members of the Caspian Tern Working Group and especially with Oregon State University Tern Research Project staff. Field staff exchange location data and any radiotelemetry detections of tagged birds from the Columbia project. Harbor seals: WDFW staff are directly communicating with staff of PSMFS and NMFS. This project is a joint collaboration with efforts in Oregon and California. Field methods and study objectives are coordinated through an interagency oversight committee to ensure compatibility of study results among the three states.

Rep-1.

Action: Prepare Governor's biennial "State of the Salmon Report", update Statewide Strategy to Recover Salmon and develop implementation plan, "Action Plan", and monitor the implementation of agencies actions.

Key Tasks	1. Prepare the Governor's biennial "State of the Salmon Report" and communicate to the Legislature and the public the content of the report. - Identify scope and content for the report, link to performance measures/indicators outlined in the Salmon Recovery Scorecard, - Report on major progress of action plan, ESA compliance strategies and other items identified in ESHB 2496 and - Include products from other actions, e.g. stock status, and ISP monitoring recommendations.) 2. Update the strategy through an active public involvement process, including public meetings to be held throughout the state. - Develop public involvement strategy- see Edu-2, and hold public meetings; - Evaluate current SSRS based on ISP review, comments, policy changes, regional and local recovery efforts, NMFS and USFWS 4(d) rules, and legislative action; - Link strategy to long term action plan, budget and Salmon Recovery Scorecard; and - Propose revisions to the strategy. 3. Develop Action Plan and budget proposals to implement the SSRS. Link to Salmon Recovery Scorecard. 4. Monitor the implementation (determine whether we did what we said we'd do and do it correctly) and effectiveness (how well actions taken achieve objectives) of the strategy, action plan and Salmon Recovery Scorecard and recommend changes if needed.
Output-workload accomplished	- Governor's biennial "State of the Salmon Report" outlining progress for the last 2 years. - Revisions of the Strategy reflecting scientific review and public comments and suggestions. - Linkages of several pieces on salmon recovery (Strategy, Budget, Action Plan, and Salmon Recovery Scorecard).
Timeline & Key milestones	December 31, 2000 - Submit the Governor's biennial "State of the Salmon Report" to the Governor, the legislature and the public. September 2000 - Begin the update of the strategy. Final revision June 2001? December 2000 - Proposed budget and Action Plan for 01-03. Final June 2001.

Staffing (FTEs) & funding ($ and sources)	2.2 FTEs (GSRO 1.5; OFM 0.5; WDFW 0.2) **Total:** $454,600 $454,600 GF-S (GSRO $275,000; OFM $150,000; WDFW $29,600)
Responsible Agency (ies)	**Cooperative** effort with GSRO lead except for budget OFM is lead. Participating in the effort include OFM, WDFW, DNR, ECY, IAC, CC, WDA, PSAT, Parks, CTED, WSDOT, and ISP. Members of the Government Council on Natural Resources and city and county associations will be involved in all activities.